

REMARKS

Claims 1-2 and 5-16 are pending after entry of this paper. Claims 1-16 have been rejected. Claims 3-4 have been cancelled without prejudice, and their subject matter has been incorporated into claim 1. Applicants reserve the right to pursue cancelled claims in a divisional or continuing application.

Claims 1, 5-6, 8, and 11-12 have been amended. Support may be found throughout the instant specification, for example, at page 3, lines 15-18.

The specification has been amended in accordance with the suggested arrangement of the specification as set forth in the Office Action. The specification has also been amended to add the abstract of the disclosure, commencing on a separate page.

No new matter has been introduced by these amendments. Reconsideration and withdrawal of the pending rejections in view of the above claim amendments and below remarks are respectfully requested.

Unrejected Claims

As an initial matter, although the Office Action Summary page lists all claims 1-16 as rejected, applicants respectfully submit that the Office Action itself does not reject each and every claim. Specifically, no rejection is included for claim 16. Applicants thus move for immediate allowance of claims 16.

Response to Rejections under 35 U.S.C. §112

Claims 1-13 have been rejected under 35 U.S.C. §112, second paragraph for indefiniteness.

Specifically, the Examiner contends that claim 1 is indefinite because it is allegedly unclear how the “lower surface of the support bar contact piece, the contact surface touching the electrolysis cell busbar and the contact surface” is achieved. Applicants respectfully disagree. However, in order to expedite prosecution and without disclaimer of or prejudice to the subject matter recited therein, applicants have amended claim 1 such that the lower surface of the contact piece is the contact surface.

The Examiner also contends that claim 1 is vague and indefinite with respect to how the transmission layer and silver or silver alloy are formed on the area of the lower surface. Solely for the purpose of furthering prosecution, applicants have amended claim 1 to include the subject matter of claims 3 and 4, specifying the method of coating the contact surface. Furthermore, as claims are to be interpreted in light of the specification, applicants respectfully direct the Examiner’s attention the instant specification as a whole, and particularly Example 1 and 2, which describe various embodiments of forming the transmission layer and silver or silver alloy layer. Applicants assert that claim 1 as amended is not indefinite.

Claims 11-12 are allegedly indefinite with respect to how the contact surface is straightened out linearly, and further, how the transmission layer is placed on the lower surface of the contact piece. Applicants again respectfully submit that claims are to be interpreted in light of the specification. The repairing of a support bar takes place in practice just as it is described in Examples 1 and 2 of the instant specification, and the contact piece is not removed

during repairing. Applicants have amended claims 11-12 to parse out the claimed steps for clarity. Applicants assert that claims 11 and 12 as amended are not indefinite.

For the foregoing reasons, applicants respectfully request withdrawal of the rejections under 35 U.S.C. §112, second paragraph.

Furthermore, although the Examiner has listed claims 1-13 as rejected under 35 U.S.C. §112, second paragraph, the Examiner has not specifically described a rejection for claim 13. Applicants submit that claim 13 is in compliance with the requirements of 35 U.S.C. §112, second paragraph, and thus respectfully request withdrawal of the rejection of claim 13 under 35 U.S.C. §112, second paragraph.

Response to Rejections under 35 U.S.C. §103

Claims 1-3, 7, and 9-15 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,045,669 (“Matsumoto”) in combination with U.S. Patent No. 2,790,656 (“Cook”) and U.S. Patent No. 4,035,280 (“Deane”). Applicants only address the rejections as they apply to independent claims 1, 11, 12, and 13.

The Examiner contends that Matsumoto discloses an electrolytic cell with an electric contact where a busbar is coated with a gold plating and the contact piece of the anode or cathode plates is contacted with the busbar. The Examiner admits that Matsumoto does not disclose the specific materials as set forth in the instant claims. The Examiner has combined Matsumoto with the teachings of Cook and Deane to satisfy this deficiency. The Examiner contends that Cook discloses an aluminum dissimilar metal joint, where an aluminum member is bonded to copper by means of a tin and lead solder to the copper, and that “[t]he silver or silver

alloy can be soldered, brazed or welded” (page 4 of the Office Action). The purpose of Cook, according to the Examiner, is to provide a joint to connect aluminum busbars and copper flexes on aluminum reduction cells. The Examiner contends that Deane discloses a contact bar having notches into which the contact piece of the header bars are located, and that the copper contact pieces are silver plated. Thus, the Examiner contends that the invention as a whole would have been obvious to one of ordinary skill in the art in light of the contact piece for an electrolytic cell of Matsumoto in combination with the choice of materials for use with aluminum anodes of Cook and Deane. Applicants respectfully disagree. Specifically, the combination of Matsumoto, Cook and Deane does not teach or suggest “forming a transmission layer on the area of the contact surface” and “coating the contact surface with a silver or silver alloy,” where “the transmission layer and the coating form a metallurgical joint with the copper contact piece” as claimed.

Matsumoto describes a method for plating a busbar or crossbars of electrodes in an electrolytic cell with gold. Matsumoto discloses that gold plating is used for the elimination of copper sulfate at electrical contacts of the electrolytic cell because copper sulfate causes corrosion and increases contact resistance. Matsumoto further describes that the busbar is made of copper, and that the gold plating film has a thickness of about 5 microns (col. 4, lines 28-31). Matsumoto does not, however, disclose a silver or silver alloy coating as required by the instant claims. Moreover, Matsumoto does not disclose a transmission layer between the copper and gold coating, as required by the instant claims.

The function of the coating as recited in the instant claims is to form good electrical contact between the support bar of the cathode and the busbar of the electrolytic cell

(page 3, lines 22-25). This is achieved by coating the contact surface of the support bar with a silver or silver alloy coating. Matsumoto is completely silent as to the use of any coating material other than gold. There is no teaching, suggestion, or motivation in Matsumoto to use a gold coating for any purpose but to prevent the formation of copper sulfate. In contrast to the gold plating of Matsumoto, the silver-based coating as recited in the instant claims has the distinct advantage of having enhanced electrical conductivity compared to copper. A silver-based coating has the additional advantage that oxides of silver are not stable and decompose back to metallic form (page 3, lines 22-30). These advantages are neither taught nor suggested by the disclosure of Matsumoto. Indeed, as gold is well-known to have an electrical conductivity that is lower than both copper and silver, the use of a gold coating by Matsumoto is tantamount to a teaching away from the use of a coating material with conductivity analogous to the material to be coated. As such, one of ordinary skill in the art would not be motivated to modify the teachings of Matsumoto to instead use a silver-based coating material with enhanced conductivity and stability to oxidation.

Cook is directed to a metal joint between copper and aluminum for use in, for example, aluminum busbar connections with copper flex in an alumina smelting furnace. A copper member is faced with a layer of buffer metal on the areas to be joined to the aluminum member in Cook (col. 3, lines 56-59). The buffer metal, according to Cook, is capable of forming a finite layer of alloy bond with copper and with aluminum (col. 3, lines 59-61). Cook discloses that the buffer metal layer can be applied by hot dipping or by depositing by hand (col. 3, lines 69-71). Although Cook contemplates silver or silver alloys as the buffer metal, (col. 4, lines 23-29):

due to the high melting point [of high purity silver] of around 1700° F, it is extremely difficult to produce a satisfactory bond between the aluminum and the silver layer at a welding temperature satisfactory for the aluminum unless the copper or steel member is preheated to a considerable temperature on the order of 400° to 500° F.

Cook does not disclose the formation of a transmission layer and a silver-based coating, where the silver-based coating and the transmission layer form a metallurgical joint with copper. In the first instance, Cook teaches away from the use of silver, touting the difficulties of using silver as the buffer metal. Furthermore, the instant application is directed to combining silver and copper so that they form a tight metallurgical joint having good electrical conductivity by including the element of “forming a transmission layer.” As set forth in the instant specification (page 3, line 25 – page 4, line 2), the formation of a tight metallurgical joint between silver and copper demands a transmission layer between them. Cook neither explicitly discloses nor suggests a tight metallurgical joint between copper and silver, which would require a transmission layer as recited in the instant claims.

Deane is directed to a contact bar (*i.e.*, busbar) for use in electrolytic cells. Deane discloses that one end of a cathode header bar (*i.e.*, support bar) can be equipped with a header piece (*i.e.*, contact piece), and that the contact bar is formed by cutting grooves at regularly spaced intervals spaced by cylindrical bar sections. Deane further teaches that a copper contact piece is welded onto one end of each cathode header bar, and that the contact piece is provided on its underside with a V-shaped notch. Deane also discloses that the copper contact pieces can be silver-plated prior to being welded to the aluminum header bar.

Deane is described in the instant specification at page 2, lines 10-17. Deane discloses plating the entire contact piece with silver before connecting the contact piece to the header bar. As stated in the instant specification, the coating of the entire contact piece is not cost-efficient and is not necessary. Furthermore, Deane neither explicitly discloses nor suggests a transmission layer as recited in the instant claims for the purpose of achieving a tight metallurgical joint between silver and copper.

In light of the foregoing discussion, applicants respectfully submit that the combination of the Matsumoto publication with the disclosures of Cook and Deane as applied by the Examiner does not teach each and every element of the invention as claimed.

Matsumoto is completely silent as to a transmission layer for the purpose of forming a tight metallurgical joint between copper and a coating. As discussed above, neither Cook nor Deane discloses a transmission layer between copper and a coating. As such, the combination of Matsumoto with Cook and Deane does not disclose each and every element of the invention as recited in the claims, specifically “forming a transmission layer...wherein the transmission layer and the coating form a metallurgical joint with the copper contact piece.” Furthermore, as discussed above, one of ordinary skill in the art would not be motivated to modify the gold coating of Matsumoto to use any other material, particularly silver. Therefore, applicants believe that the rejection under 35 U.S.C. §103(a) is improper, and respectfully request withdrawal of same.

Dependent Claims

The applicants have not independently addressed all of the rejections of the dependent claims. The applicants submit that for at least similar reasons as to why independent claims 1, 11, 12, and 13 from which all of the pending dependent claims 2, 5-10, and 14-16 depend are believed allowable as discussed *supra*, the dependent claims are also allowable. The applicants however, reserve the right to address any individual rejections of the dependent claims and present independent bases for allowance for the dependent claims should such be necessary or appropriate.

Thus, applicants respectfully submit that the invention as recited in the claims as presented herein is allowable over the art of record, and respectfully request that the respective rejections be withdrawn.

CONCLUSION

Based on the foregoing amendments and remarks, applicants respectfully request reconsideration and withdrawal of the rejection of claims and allowance of this application. Favorable action by the Examiner is earnestly solicited.

AUTHORIZATION

The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. **13-4500**, Order No. 4819-4741.

Applicants believe this paper to be timely filed. In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. **13-4500**, Order No. 4819-4741.

Respectfully submitted,
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By: _____


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